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LAW OFFICE OF JAMES LEAS

802 864-9319

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: Selzer
Application No.: 09/876,443
Filing Date: June 7, 2001
Title: Method of Improving X-Ray
Lithography in the Sub 100nm
Range to Create High Quality
Semiconductor Devices

Docket No. 1520-006 (1426)
Date: September 26, 2002
Group Art Unit: 2882
Examiner: I. Kiknadze
FAX: 703 305-3594
No. of pages sent: 4

Response Under 37 CFR 1.111
Response D

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Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

This is in response to the office action dated June 27, 2002. No fee is due by virtue of this response.

CERTIFICATE OF MAILING	
I hereby certify that, on the date shown below, this correspondence is being:	
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<input type="checkbox"/> deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner of Patents Washington, DC 20231.	<input checked="" type="checkbox"/> transmitted by facsimile to the Patent and Trademark Office.
Date: <u>9/26/02</u>	<u>James M. Leas</u> Name <u>James M. Leas</u> Signature

1520-006 (1426)

Page 1 of 4

09/876,443

Remarks

Claims 11-25, 27, 37-38, and 40-50 are pending in the application. No new matter has been added by virtue of this response. Reconsideration of the application is requested.

Allowed claims

Applicant thanks the Examiner for the allowance of claims 11-25 and 27 and for the allowability of claims 44 and 45 if rewritten in independent form.

Claim Rejections--35 U.S.C. § 102(b)

The Examiner rejects claims 37, 38, and 40-42 under 35 U.S.C. § 102(b), as being anticipated by Terasawa. The Examiner states that Terasawa discloses (FIG 6) the method described in claim 37. However, claim 37 has at least two elements not disclosed or suggested by Terasawa, as indicated in bold type below.

37. A method of exposing a resist on a substrate comprising the steps of:

- a) providing the substrate with a film of resist;
- b) placing the substrate on a stage;
- c) providing x-ray radiation **from a point source**;
- d) **collimating or concentrating** said x-ray radiation;
- e) providing a mask for defining exposure of said resist;
- f) illuminating said mask with said x-ray radiation after said collimating or concentrating step (d); and
- g) exposing said resist **with x-ray radiation passing through said mask**.

In column 9, lines 25-26, Terasawa states, "Futhermore, since the radiation source 1 can be **substantially regarded** as a point source of radiation . . ." Applicant would ask the Examiner to consider that Terasawa therein acknowledges that the radiation source 1 is not a point source. Terasawa's source is a synchrotron source which has very little divergence angle in the vertical plane, as shown in FIGS. 2 and 8. Terasawa's source has substantial divergence only in the horizontal plane. A point source has substantial

divergence in both planes to provide illumination of a substantial area. Terasawa's synchrotron source illuminates a line shaped region and Terasawa must be scanned to illuminate an area. Thus, although he states that his radiation source can be substantially regarded as a point source, Terasawa does not teach or suggest using a point source.

Nor does Terasawa teach or suggest **collimating or concentrating** the x-ray radiation. Terasawa provides for focusing the x-ray radiation but focusing is different from collimating or concentrating.

Finally, Terasawa's optical path for the x-ray radiation does not have it **passing through the mask**. In Terasawa, the x-ray radiation is **reflected off mask 3**. (In fact the x-ray radiation in Terasawa does not pass through any optical components). Thus, claim 37 is clearly distinguished from the teachings of Terasawa, and the rejection of claim 37 under 35 U.S.C. § 102(b), as being anticipated by Terasawa has been traversed.

Claim Rejections--35 U.S.C. § 103(a)

The Examiner rejects claims 43 and 46-50 under 35 U.S.C. § 103(a), as being unpatentable over Terasawa in view of Hasegawa. The Examiner states that Terasawa generally shows all that is claimed except using a displacement sensor sensing the position of the substrate. He states that Hasegawa discloses (FIG. 106) an exposure apparatus and method using a displacement sensor 41 to sense the position of the substrate 10 with relation to mask 20, indicating an optimum gap.

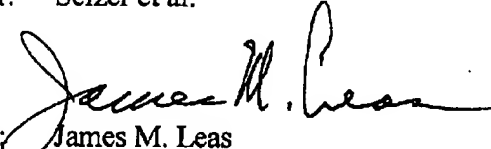
Applicant would respectfully ask the Examiner to consider that the neither Terasawa nor Hasegawa, nor the combination teach or suggest providing radiation from a point source. Both references use a synchrotron source to obtain the high intensity x-radiation. Hasegawa also does not teach collimating or concentrating. Thus, the references individually and in combination do not teach or suggest elements of independent claim 37 from which claims 43 and 46-50 depend.

Furthermore, with respect to claims 43 and 46-50 applicant would respectfully ask the Examiner to consider that it would not be obvious to use the displacement sensor of Hasegawa in Terasawa since Hasegawa is measuring a minute gap and Terasawa has no minute gap. There is nothing equivalent in Terasawa's reflection system. Thus, the gap displacement sensor teaching of Hasegawa could not be applied in Terasawa to provide for "**sensing the position of the substrate with a displacement sensor.**" Thus, the rejection of claim 37, and claims dependent thereon, including claims 43 and 46-50 has been traversed.

Applicant has reviewed the prior art made of record and not relied upon and believes that it does not teach or suggest the invention as described in the claims.

It is believed that the claims are in condition for allowance. Therefore, applicant respectfully requests favorable reconsideration. If there are any questions please call applicant's attorney at 802 864-1575.

Respectfully submitted,
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